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(54) IMPROVEMENTS IN OR RELATING TO PUNCH PRESSES

(71) We, U.S. AMADA LIMITED, a company organised under the laws of the State of Washington, one of the United States of America, of 615 8th Avenue South, Seattle, Washington, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to punch presses and is particularly concerned with turret punch presses.

The invention aims to provide a turret punch press which can carry more tools than conventional turret punch presses.

According to a first aspect of the present invention there is provided a punch press having a multi-track turret mechanism rotatable about a central axis, the turret mechanism including an upper and a lower turret each having multi-tracks for holding a plurality of circumferentially spaced tools some of which are at different radial distances from the central axis from others, means for rotating the turret into selected positions, a punch striker, means for moving the striker radially to positions over respective tool pairs, and means for driving the striker against a tool disposed below the striker.

The radial spacing of the tools provides for aligning several smaller tools at radially different distances from the central axis of the turrets to increase the number of tools on the turrets. A further advantage is that a tool may be positioned much closer to the periphery of the turrets allowing for considerably less interference to the work piece holding means and permitting greater work area coverage.

For a better understanding of the present invention and to show how the same may be carried into effect reference will now be made, by way of example, to the accompanying drawings in which:—

Figure 1 shows a perspective view of a punch press in accordance with the present invention,

Figure 2 shows a vertical sectional view of part of the press of Figure 1, and

Figure 3 shows a plan view of an upper turret forming part of the press of Figure 1.

Referring now to the drawings, Figure 1 illustrates a C-frame punch press 10 housing a work-piece holder 12 and work-piece positioning means 14.

The punch press 10 carries a turret mechanism 15 and a ram 16. The turret mechanism 15 includes upper and lower turrets 20 and 22 keyed to shafts 18 and 19 for rotation about a central axis 17. The turrets contain a plurality of tools, such as punches 23, at least some of which are radially spaced along tracks A, B and C. As is readily apparent a large number of tools may be positioned on the turrets. For example, a typical installation could utilize more than 30 additional tools. Furthermore, even individual small tools may be positioned on track C further out from the central axis 17 than the larger tools which are required by their size to be positioned on an inner track.

The lower turret 22 is provided with the complementary portion of the tools, such as dies 25, aligned respectively below the corresponding punches 23. Thus the dies 25 are also spaced on tracks that are spaced in radially varying distances from the central axis 17.

The ram 16 includes an eccentric 30 connected to a ram body 32 which is mounted for slidable vertical movement in the punch press frame. The ram body is provided with radially spaced recesses 34 corresponding to the radially spaced tracks A, B and C of the turret mechanism 15. A backup plate 35 of hard material is positioned adjacent the ram body and is provided with apertures 36 in alignment with the recesses 34. A shear plate 38 of inexpensive material is readily replaceably positioned against the backup plate 35 and is of a material which will shear at some predetermined stress less than the overload limit of the press.

[Price 25p]

Price 33p

The ram body 32 is provided with a guide 40 which slidably receives a support member 42. The member slidably receives a striker 44 having an enlarged head to allow the support member to support the striker while still allowing the striker to move vertically upward relative thereto. Thus it is readily apparent that when the striker 44 is positioned below one of the apertures 36 and above the corresponding tool on the turrets an overload will drive the striker relative to the support member 42 pushing a slug from the shear plate 38 into the aperture of the backup plate. In other words, the striker, shear plate, and backup plate act much like an inverted punch and die.

The means for radially moving the striker 44 includes drive means 48. The drive means includes two radially spaced cylinders 49 and 50 separated by a block 51. A piston 52 is slidably received in the cylinder 49 and is fixed to a rigidly mounted piston rod 54. A piston 56 is slidably received in the cylinder 50 and is secured to a movable piston rod 58. The movable piston rod 58 is secured to a coupling 60 that is connected to the support member 42 to move the support member radially but allow relative vertical movement between the coupling and the support member. Control means 62 are coupled by pneumatic lines to ports 63 provided in each of the cylinders.

WHAT WE CLAIM IS:—

1. A punch press having a multi-track turret mechanism rotatable about a central axis, the turret mechanism including an upper and a lower turret each having multi-tracks for holding a plurality of circumferentially spaced tools some of which are at different radial distances from the central axis from others, means for rotating the turrets into selected positions, a punch striker, means for moving the striker radially to positions over respective tool pairs, and means for driving the striker against a tool disposed below the striker.

2. A punch press according to Claim 1; wherein the means for moving the striker comprises means for supporting the striker, drive means for moving the support means radially of the central axis, the drive means being connected to the support means for allowing relative vertical movement therebetween so that the striker can be driven downwardly against a tool disposed below the striker.

3. A punch press according to Claim 2, wherein the drive means comprises a ram having at least two cylinders spaced radially of the central axis, a piston in each cylinder, a fixed piston rod secured to the piston in the radially inner cylinder, a movable piston rod secured to the piston in the radially outer cylinder, and secured to the support means, and control means for supplying fluid under pressure into a respective cylinder for moving the same, and the piston rod therein, relative to one another so that the support means is moved radially of the central axis into a predetermined position.

4. A punch press according to Claim 1, 2 or 3, wherein the means for driving the striker comprises a backup plate having apertures aligned with respective radial positions of the striker, and a shear plate between the striker and the backup plate, and wherein the means for moving the striker is adapted to allow the striker to move freely in an upwardly direction whereby an overload will drive the striker up through the shear plate.

5. A punch press substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.

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